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ON THE APPEARANCE OF CARBAMIC ACID IN THE URINE AFTER THE CONTINUED ADMINISTRATION OF LIME WATER, AND THE FATE OF CARBAMIC ACID IN THE BODY.

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[*Read before the Johns Hopkins Hospital Medical Society.*]

It has long been known that an excess of lime water added to the food will render the urine alkaline, but so far as I can ascertain no inquiry has ever been made into the nature of this alkalinity nor into the chemical conditions accompanying it. My attention was first directed to this question by an incident that occurred in the practice of Prof. V. C. Vaughan of the University of Michigan. A mother for whose infant lime water had been prescribed and who had administered it very freely for some months, consulted Prof. Vaughan because of the ammoniacal odor of the child's linen when once it had been moistened with urine. On examination the urine was found to be strongly alkaline and to yield free ammonia. No inflammation of the bladder or other abnormal condition could be detected as a cause for the ammoniacal urine. That a perfectly fresh urine voided from a healthy bladder should give off free ammonia is certainly a fact that calls for examination. Assisted by Dr. Archibald Muirhead, I accordingly performed a series of experiments the results of which I am inclined to believe will be of interest to you. We began our experimental inquiry with a study of the urine of healthy dogs about a year old fed on bone-free meat and fat and found, as was to be expected, that with such a diet the urine is generally acid in reaction, though sometimes amphoteric or faintly alkaline immediately after meals. Such neutral or alkaline urines, strange to say, often yield very small quantities of free ammonia, especially, so it appeared to us, when the dogs were fed on the ordinary refuse of the butchers' shops—that is, with meat containing much bone.

Having convinced ourselves that only very small quantities of free ammonia when any are given off by the normal urine of the dog, we proceeded to examine the effect of feeding large doses of calcium hydrate. Thick cream of lime was mixed in equal parts with bran or crumbed bread, the mixture enclosed in large gelatine capsules and then placed far back on the tongue of the dog who was thus forced to swallow the bolus. By feeding twice a day it is an easy matter to administer daily to a large dog 8 to 10 grams of slaked lime, and this without causing any symptoms of disturbed digestion or any other untoward effects beyond more or less constipation, if only care be taken to administer the lime immediately after meals. When the dogs have been taking such large quantities of lime for five or six days, the freshly-voided urine exhibits the characteristics of the specimens that I have brought here to show you.

You will observe that the urine is strongly alkaline, a strip of red litmus paper dipped into it at once turns a deep blue

and a moistened strip of red litmus suspended from a cork in the mouth of the flask also turns blue in the course of a few minutes. You will also observe that the urine is very turbid, that a film of crystals forms on the surface and that a heavy deposit of crystals lies on the bottom of the flasks. This increased turbidity, the surface film and the heavy sediment are almost entirely due to the deposition of crystals of ammonio-magnesium phosphate in all stages of growth. I am well aware that triple phosphates are often to be found in the urine of cats and dogs fed on meat, but they are never deposited so constantly and in such quantities as in the urines under discussion. It must be noted, too, that the triple phosphates are to a large extent precipitated in the bladder itself in the case of dogs fed on lime, for the urine is very turbid at the time that it is voided. A microscopic examination of the surface film often demonstrates the presence of biscuit-shaped crystals, soluble in acetic or hydrochloric acid, with the evolution of much gas. These biscuit-shaped crystals, therefore, are composed of calcium carbonate and they are only to be found when very much lime has been taken and relatively little water has been drunk.

In order to estimate the quantity of ammonia emitted spontaneously by the urine of healthy dogs both before and after feeding lime we proceeded as follows. Twenty-five cubic centimeters of the freshly voided urine were placed in a bowl under a dish containing ten cubic centimeters of normal sulphuric acid and both covered with a small bell jar as in the Schlösing method for determining ammonia. A strip of moistened red litmus paper was hung from the upper part of the bell jar to indicate the time when the absorption of the NH_3 should be complete. Since this absorption requires from five to seven days, a drug that will prevent fermentation must be added to the urine. We employed thymol for this purpose, first breaking it up into small pieces, adding liberally of these and stirring them into the urine before covering it with the bell jar. Check experiments with normal urines were always made in order to exclude the possibility of ammoniacal fermentation. In all cases the urines remained perfectly clear with the exception of the surface layer of thymol and the heavy deposit of triple phosphates. When the strip of red litmus in the upper part of the bell jar that serves as indicator again changes from deep blue to pink, the absorption of ammonia is so far complete that the residual titration of the normal sulphuric acid used for absorbing the ammonia may be undertaken. In a series of such absorption experiments it was found that the following amounts of ammonia had been given off by specimens of lime urine.

Dog No. 1,	20	cc.	of	morning	urine	yielded	0.0033	NH_3	in 5 days.
" "	40	"	"	"	"		0.0074	"	" 9 "
Dog No. 2,	25	"	"	"	"		0.0054	"	" 7 "
" "	25	"	"	"	"		0.0031	"	" 7 "
" "	25	"	"	"	"		0.0044	"	" 7 "
" "	25	"	"	"	"		0.0070	"	" 7 "
" "	25	"	of	evening	"	"	0.0072	"	" 7 "

Without lime the urine yields, as I said before, only little or no ammonia. Thus the highest amount ever obtained from the normal urine (25 cc.) of dog No. 1, under the conditions of absorption just stated, was 0.0016 gram. The normal urine of dog No. 2 gave off no ammonia to the standard acid solution during the time that he was under observation. The urine of a third dog which was also more often devoid of free ammonia than otherwise however once yielded 0.00195 gram of ammonia.

These absorption experiments therefore demonstrate that there is regularly a large spontaneous emission of NH_3 from the lime urines, that is, large in comparison with the total amount of ammonia contained in normal urine. A glance at the tabulated results that will be given later, in which the total ammonia in 20 cc. of urine as well as in the 24 hours urine is set down, will make this point very evident.

As the ammonia of urine is ordinarily present in the form of salts, it was of interest to determine what proportion of the ammonia of lime urines was present as free ammonia, and what proportion in the usual form of ammonia salts. In order to solve this question we placed 40 cc. of urine that had stood nine days under the bell jar and had yielded 0.0074 gram NH_3 in that time, into an ordinary exsiccator for another ten days, occasionally adding water to make good the absorption. At the expiration of this time the urine was filtered free of the thymol and sediment of phosphates and treated for ammonia by the Schmiedeberg process. Not a trace of ammonia could be discovered,—hence this particular specimen of urine contained no ammonia in the ordinary form of stable salts of ammonia, all of the ammonia being present as free ammonia. Later experiments have, however, convinced me that this is not always the case, and an investigation is now being carried on in my laboratory on the excretion of ammonia under various clinical conditions in which this question will again be discussed. Leaving aside, then, the question as to the relative amount of ammonia present in the form of free ammonia and stable salts as for the present still *sub judice*, we come to a second question of pharmacological interest, and I should like to digress far enough to treat it here. Does more or less ammonia leave the body in 24 hours after feeding with lime than before, other conditions such as food and drink remaining constant? The experiments of Coranda,* Munk and Salkowski† have taught us that salts of the fixed alkalis, sodium carbonate for example, lower the amount of ammonia excreted in the twenty-four hours urine. Now sodium carbonate, while it causes the urine to become alkaline in reaction, does not, as I have demonstrated, cause the appearance of free ammonia. This marked difference in the influence of the two drugs on the character of the alkalinity of the urine caused us to test the influence of lime on the total ammonia excretion. Ammonia determinations were made twice a day by the Schmiedeberg‡ method for a number of consecutive days before and after feeding with lime. Briefly stated, this method, which is to be preferred to the Schlösing method for dog's urine, involves the following manipulations. Twenty cc. of the urine are precipitated with platinum

*Archiv f. experimentelle Pathol. u. Pharmakol., Bd. 12, pp. 76–96.

†Archiv f. pathol. Anat. 1877, Bd. LXXI. Maly's Jahresber. der Thier. Chemie, Bd. VII (1877), pp. 192–4.

‡Archiv f. exp. Pathol. u. Pharmakol., Bd. 7, p. 166, in paper by F. Walter: Untersuchungen über die Wirkung der Säuren auf den thierischen Organismus.

Excretion of NH_3 during Period of No-Lime.

	Amount of urine in cc.	Reaction.	NH_3 in 20 cc. of urine.	NH_3 in noon and evening urines.	NH_3 in morning urine.	NH_3 in the 24 hours urine.	
August 14.	noon } 359. evening }	weakly alkaline. }	0.01008	0.18093	..	..	One kilogram of Spratt's biscuits consumed daily.
	morning 180.	acid.	0.01898	..	0.17082	0.3517	
August 15.	noon } 350. evening }	weakly alkaline. }	0.0094	0.1645	..	..	
	morning 250.	acid.	Not determined. Accident.	..	0.1487*	0.3132	
August 16.	noon } 400. evening }	weakly alkaline. }	0.0044	0.0880	..	..	
	morning 280.	acid.	0.01058	..	0.1481	0.2361	
August 17.	noon } 337. evening }	weakly alkaline. }	0.00638	0.1075	..	..	
	morning 250.	acid.	0.0116	..	0.1450	0.2525	
August 18.	noon } 281. evening }	weakly alkaline. }	Not determined. Accident.	0.13197†	..	..	
	morning 218.	acid.	0.01293	..	0.14093	0.2729	
August 19.	noon } 253. evening }	weakly alkaline. }	0.00924	0.11688	..	..	
	morning 242.	acid.	0.01024	..	0.1239	0.2407	

*This number was found by using an average for the NH_3 in 20 cc. of morning urines.

†This number was found by using an average for the NH_3 in 20 cc. of the evening and noon urines. The occasional use of an average or mean value in calculating the NH_3 in half of the twenty-four hours urine cannot appreciably affect the results of such a long series of analyses as the above, where two separate ammonia determinations are made in the twenty-four hours.

Excretion of NH_3 during the Period of Feeding Lime.

	Amount of urine in cc.	Reaction.	NH_3 in 20 cc. of urine.	NH_3 in noon and evening urines.	NH_3 in morning urine.	NH_3 in the 24 hours' urine.	Weight of Spratt's biscuits consumed, in kilogram.
August 23.	noon } 365. evening }	weakly acid. }	0.00621	0.11643	..	..	..
	morning 305.	alkaline. } acid.	0.00924	..	0.14091	0.2573	0.635
August 24.	noon } 210. evening }	alkaline. }	0.00386	0.04053	..	..	..
	morning 257.	" } weakly acid.	0.01092	..	0.14032	0.1808	0.710
August 25.	No analyses made because the morning urine not yet strongly alkaline.						
August 26.	noon } 360. evening }	alkaline. }	not determined.	0.1335*	..	..	..
	morning 125.	" } "	0.01612	..	0.1007	0.2342	0.830
August 27.	Results damaged owing to the occurrence of an accident while catching the urine.						0.770
August 28.	" " " " " " " " " "						0.625
August 29.	noon } 240. evening }	strongly alkaline gives } off much NH_3. }	0.00672	0.08232	..	..	..
	morning 200.	" " " "	0.01008	..	0.1008	0.1831	0.875
August 30.	noon } 255. evening }	strongly alkaline gives } off much NH_3. }	0.0084	0.1051	..	..	..
	morning 200.	" " " "	0.00688	..	0.0688	0.1739	0.625
August 31.	noon } 362. evening }	strongly alkaline gives } off much NH_3. }	0.0049	0.0887	..	..	..
	morning 145.	" " " "	not determined.	..	0.0538*	0.1425	0.615
September 1.	noon } 200. evening }	strongly alkaline gives } off much NH_3. }	0.01192	0.1192	..	..	..
	morning 185.	" " " "	0.00806	..	0.0745	0.1937	0.830
September 2.	noon } 270. evening }	strongly alkaline gives } off much NH_3. }	not determined.	0.10017	..	..	..
	morning 205.	" " " "	0.0047	..	0.04817*	0.1483	0.900

*These values were found by using averages for the morning or afternoon urines, as the case might be, as already explained.

chloride and 5 to 6 volumes of a mixture composed of two volumes of absolute alcohol and one volume of ether, and allowed to stand in a cool place for 24 hours. The precipitate is then collected and thoroughly washed with ether and alcohol, and after drying is reduced with zinc and hydrochloric acid at a moderate temperature. When the precipitate of platinum salts has been entirely decomposed and the filtrate from it is colorless the latter is distilled with magnesium oxide, the distillate is caught in a properly arranged flask containing 10 cc. of normal sulphuric acid and titrated back with ¼ normal sodium hydrate solution.

It did not seem necessary to put the dog into nitrogenous equilibrium, for food and other conditions remaining constant, any strikingly large variation in ammonia excretion during the lime treatment could only be referred to the lime as its cause. The food consumed by the dog consisted of Spratt's biscuits and was carefully weighed before and during the period of lime treatment; the dog was also weighed before beginning the experiments at the end of the no-lime series of analyses and again at the close of the lime series. During the time of the analyses the dog was confined in a roomy cage, the urine, however, was caught three times a day, the dog having been trained to urinate into a glass vessel when presented. In these quantitative experiments in which Spratt's biscuits were fed no constipation followed the lime treatment for the reason that this food tends to cause looseness of the bowels. The tables, page 39, contain the results of the ammonia estimations during the periods of the no-lime and of the lime treatment.

The dog's weight on the 8th of August was found to be 45.5 kg. On the 22nd of August the dog's weight was again taken and was found to be 47.25 kg. On the 6th of September some days after the close of the lime period it was found to be 47.5 kg. On the 21st of August milk of lime was mixed for the first time with the food. A glance at the columns in which the total NH_3 excretion for the 24 hours is put down will make it evident how marked is the falling off in the ammonia output when once the dog's system is thoroughly under the influence of slaked lime. If we entirely neglect the circumstance that the dog increased more in weight during the first or no-lime period than during the time of the lime treatment, since it is impossible to determine by calculation what relation this fact bears to the ammonia excretion, and if we assume that the NH_3 excretion is proportional to the amount of food digested, and if we furthermore make the proper correction in the numbers that represent the NH_3 output during the lime period, we shall still have a large unaccounted-for deficit in NH_3 excretion. Thus during six consecutive days of no-lime and a total consumption of six kg. of Spratt's biscuits the total NH_3 output = 1.6671 grams NH_3; during *five consecutive days of lime treatment* (from the 29th of August to the 2nd of September inclusive), and during a total consumption of 3.845 kg. of Spratt's biscuits, the total NH_3 output = only 0.8415 gram. For six days at the same rate of food consumption and ammonia excretion the NH_3 output would have amounted to 1.0124 grams. If the dog had consumed in these six days of lime treatment 6 kg. of biscuits instead of 4.614 kg., and if the NH_3 excretion had increased in proportion, we should have had an output of only 1.3131 grams. If this amount is compared with the output actually obtained in the six days of the no-lime period, viz. 1.6671 grams, we find that 21.23 per cent. less NH_3 is excreted in the 24 hours when dogs are fed with large quantities of slaked lime then when no lime is given. That the smaller amount of food taken during the period of treatment was not due to the lime taken was demonstrated by the fact that the dog did not again consume 1 kg. of biscuits after the cessation of the treatment. As has been remarked before, nothing abnormal could be detected in the dog's condition during the time of treatment. It must be evident, therefore, that lime-water if given in large quantities and continuously will lower the output of ammonia as markedly as do the carbonates of the fixed alkalis. I may remark in passing that such experiments as the above are the counterpart of those performed by Walter,* Hallervorden,† Coranda‡ and Salkowski,§ who found that the administration of hydrochloric acid greatly increased the ammonia output of the 24 hours' urine.

There are a few more questions touching this ammoniacal state of the urine that must be referred to. Thus, the morning urine for some time after the appearance of the free ammonia owes its alkalinity entirely and alone to the ammonia. A strip of red litmus moistened with morning urine, if allowed to dry in an atmosphere free from the fumes of ammonia and volatile acids, or placed under the bell jar of an exsiccator, quickly takes on its original red color, thus demonstrating that the alkalinity of the urine in question is due solely to the ammonia emitted by it. Such a specimen of urine, if evaporated somewhat on the water-bath and then restored to its original volume by the addition of water, will show a weakly acid reaction in place of its former markedly alkaline reaction. The noon and evening urines owe their alkalinity partly to stable salts, for a strip of red litmus paper dipped into them retains its blue color on drying. The behavior of the morning urine,‖ then, does not support the opinion that the ammonia emitted by it is driven out by some salt of the fixed alkalis or alkaline earths, otherwise one would suppose that a strip of red litmus would remain blue after the evaporation of the ammonia. We must look, therefore, to some unstable compound that breaks down of its own accord as the source of the free ammonia. One such compound known to us is sodium ammonium phosphate, $PO\begin{cases} ONa \\ ONH_4 \\ OH \end{cases}$, found in guano and in inspissated urine, an aqueous solution of which liberates ammonia even at ordinary temperature in accordance with the following formula of decomposition: $PO\begin{cases} ONa \\ ONH_4 \\ OH \end{cases} = PO\begin{cases} ONa \\ OH \\ OH \end{cases} + NH_3$. But we shall give reasons that make it more than probable that the ammonia about whose source we are concerned does not leave the kidney in the form of this phosphate.

* Archiv f. exp. Pathol. u. Pharmakol., Bd. VII, pp. 148–178.

† *Ibid.* Bd. XII, pp. 237–75.

‡ *Ibid.* Bd. XII, pp. 76–96.

§ Archiv f. pathol. Anat. u. Physiol., Bd. 58, p. 23.

‖ After long feeding with lime the morning behaves more like the day urines.

We have thus far dealt with the following characteristics of lime urine: the deposition of triple phosphates while the urine is still in the bladder, the spontaneous liberation of much ammonia, its high alkalinity, and the presence of spherules of calcium carbonate. The addition of a few drops of strong hydrochloric acid to a specimen of lime urine generally causes a marked effervescence. That the freshly voided urine contains much carbon dioxide is shown by passing a current of washed air through it and then into a clear solution of barium hydrate, and this may be kept up for many hours without exhausting the supply of CO_2 in the urine. Unfortunately no quantitative analyses were made of the amount of CO_2 that can be pumped out of such a lime urine. Boiling the urine throws down a granular sediment that is dissolved with effervescence on the addition of an acid, and therefore contains $CaCO_3$. Has the frequent appearance of spherules of $CaCO_3$ in the urinary sediment and its high content of $CaCO_3$ in a state of solution any connection with the large amount of ammonia given off by the lime urine? or is the $CaCO_3$ that is thrown down when the urine is boiled present only in the form of the soluble acid salt, $Ca(HCO_3)_2$? If the latter assumption holds good, then no further precipitation of $CaCO_3$ should occur on boiling a urine from which all the bicarbonate of calcium has previously been removed. To accomplish this, one has but to add some freshly prepared milk of lime and shake vigorously for ten or fifteen minutes, then allow to settle for half an hour, then filter and add to the filtrate a few drops of concentrated solution of calcium chloride to decompose any ammonium carbonate that might perchance have escaped the decomposing action of the milk of lime, then add a knife-point full of freshly prepared crystalline calcium carbonate which has been kept under distilled water in a perfectly tight bottle, again shake vigorously for ten minutes, allow to settle for half an hour and again filter. The knife-point full of crystalline calcium carbonate is added for the purpose of inducing any amorphous or semi-crystalline calcium carbonate that may have remained in solution after the first shaking with milk of lime to fall out as crystalline calcium carbonate. This method, if carefully followed out with properly prepared reagents, will remove all the bicarbonate of calcium from an ammoniacal solution containing it, such as the lime urines in question. But if the urine from one of the lime-fed dogs is treated in this way it will still deposit calcium carbonate on boiling, and the precipitate formed at the bottom and sides of the test-tube will dissolve with effervescence on the addition of an acid. A few bubbles of CO_2 may be obtained from a normal urine treated in this way if the shaking-out methods that we have outlined are carelessly employed, but the much more marked evolution of CO_2 obtained when a lime urine is similarly treated cannot be referred to bicarbonate of calcium that has escaped precipitation. One must conclude, therefore, that the lime urine contains in solution a compound that is not precipitated by the reagents that throw down bicarbonate of calcium, but that it agrees with the bicarbonate in its inability to withstand boiling, like it depositing $CaCO_3$ when its aqueous solutions are heated. This compound has been shown by Mr. Muirhead and myself to be calcium carbamate, a salt remarkable for the instability of its aqueous solutions even at ordinary temperatures. Thus, a clear filtered solution of this salt remains clear at ordinary temperatures for a few minutes only, soon becomes turbid from the deposition of calcium carbonate, and gives off ammonia and CO_2. At room temperature this decomposition is not complete, that is, not all the carbamate in solution breaks up at once, for when once NH_3 has appeared it exercises an inhibitory influence on the further decomposition so that some of the salt may remain undecomposed for a long time. On heating to about 55°, or on boiling, the dissociation is rapid and complete. The following equation illustrates the manner of this decomposition: $\left(CO<_{O}^{NH_2}\right)_2 Ca + H_2O = CaCO_3 + 2NH_3 + CO_2$. Bearing the properties of calcium carbamate in mind, we can explain all the peculiarities of the lime urine, namely, the presence of free ammonia, of much CO_2, the frequent occurrence of $CaCO_3$ in the urinary deposit, the constant and large precipitation of ammonio-magnesium phosphate in the bladder, and the presence of calcium carbonate in solution after removing any bicarbonate of calcium that may have been present. A connection is therefore most clearly established between these various occurrences if we can prove that calcium carbamate is really present in the lime urines. The behavior of the lime urines toward boiling after the previous removal of any bicarbonate of calcium possibly present, made us suspect the presence of the carbamate, and encouraged us to attempt its isolation. To this end we treated from four to five litres of the urine of dogs that were being fed on meat and lime, by a method first suggested by Drechsel* for the isolation of carbamic acid from the urine. Briefly stated, this method consists in expelling the ammonia of the urine with milk of lime, and getting rid of any ammonium carbonate or bicarbonate of calcium that may be present in the way already described, then precipitating in the cold with at least three volumes of cold absolute alcohol, allowing to stand on ice for fifteen hours, collecting the precipitate as rapidly as possible by filtering under pressure, redissolving it when dry in ammonia, and reprecipitating with cold absolute alcohol by the fractional method. The third fractional precipitate with absolute alcohol was allowed to stand on ice for fifteen hours, the precipitate collected by filtering under pressure, washed with absolute alcohol and ether to remove all traces of moisture and ammonia and then dried *in vacuo* over sulphuric acid. This final precipitate occurs, when dry, in the form of white porous pieces that yield when pulverized a slightly yellowish powder almost entirely soluble in water. Its aqueous solution behaves entirely like solutions of calcium carbamate synthetically† prepared in the laboratory. Thus, the clear filtrate becomes turbid in a few moments, throwing down crystalline calcium carbonate and giving off ammonia. On heating to about 55° C., or on boiling, this decomposition takes place immediately. Unfortunately this white powder that we have isolated from the urines is not pure calcium carbamate, it consists in large part of conjugate sulphates of calcium, and according to

* Drechsel u. Abel, Archiv f. (Anat. u.) Physiol. 1891, p. 238.

† Journ. f. prakt. Chem. (2), Bd. 16, pp. 188–92.

Nencki and Hahn* who have more recently examined it, also contains small quantities of a salt of acetic acid.

The equation for the decomposition of calcium carbamate in an aqueous solution that has already been given, namely, $\left(CO<_{O}^{NH_2}\right)_2Ca + H_2O = CaCO_3 + 2NH_3 + CO_2$, at once suggests a method of gravimetric analysis for this salt, even though other compounds be present, provided none of these yield ammonia or calcium carbonate when the solution is boiled. That is, if a solution of this salt be decomposed by boiling, and the ammonia arising from its decomposition be distilled off and caught, we ought to find two molecules of ammonia to one of calcium carbonate left as a crystalline sediment in the flask. To test the question we dissolved 0.6803 gram of an impure specimen of calcium carbamate that had been prepared synthetically some months before and which had therefore largely broken down, in water, filtered off quickly from the large insoluble residue of calcium carbonate directly into the decomposition flask and applied heat. The ammonia given off was taken up in hydrochloric acid and estimated as a platinum double salt, the sediment of calcium carbonate in the decomposition flask was collected, dried, weighed, incinerated and estimated as calcium oxide. We found 0.0265 gram CO_2 : 0.02029 gram of NH_3. The proportion CO_2 : $2NH_3$ demands for 0.0265 CO_2, an amount of NH_3 represented by 0.02047 gram, showing a very close agreement. These results prove that this analytic method will enable us to demonstrate the presence of this salt in solution, provided, as we have said, no other compounds that yield either ammonia or calcium carbonate on boiling are present. We have made a number of analyses of the crude carbamate isolated by us from lime urines, but none of them have been satisfactory from the quantitative point of view. In all cases the amount of $CaCO_3$ found was far in excess of that required by the proportion CO_2 : $2NH_3$. Thus, in one experiment we found 0.0238 CO_2: 0.01018 NH_3, but 0.0238 CO_2 requires 0.01839 NH_3. In a second analysis we found 0.0211 CO_2 and 0.0124 NH_3. Our proportion, however, demands for 0.01211 CO_2 an amount of NH_3 represented by 0.0163. It is perhaps permissible to assume that a basic salt had been formed by the action of the milk of lime on the normal carbonate during the tedious process of isolation already described. The basic salt would have the formula $H_2N.CO.O.Ca.OH$, its aqueous solutions would decompose on boiling according to the following equation, $H_2N.CO.O.Ca.OH = CaCO_3 + NH_3$, and its presence in varying proportion would therefore cause a variation in the amount of CO_2 found on decomposing the crude product isolated from the urine. A fuller discussion of this question and more complete details of the above analyses will be found in our previous papers on this subject.† Whatever opinions may be held as to the presence of a basic carbamate, it is certain that the powder isolated by us contains as a further impurity an unknown compound which also deposits $CaCO_3$ on boiling but which yields no ammonia. We know this from the behavior of the filtrate of a solution of the crude carbamate from which all traces of carbamic acid have been removed by boiling till no more ammonia is given off. If such a filtrate is again subjected to a half-hour's boiling, or is allowed to stand for some hours, calcium carbonate is again deposited, though only in small quantities, while no more ammonia is liberated. We have, therefore, sufficient explanation for the high percentage of calcium carbonate found by us and for the unsatisfactory outcome of our quantitative analyses. But although the quantitative results are far from satisfactory, the behavior of aqueous solutions of the crude product so frequently referred to is so entirely like that of a solution of synthetically prepared carbamate, especially in respect to the rapid deposition of $CaCO_3$ and the liberation of NH_3, that we are justified in concluding that the lime urines contain calcium carbamate, and we are all the more justified in this conclusion since a qualitative analysis of the powder demonstrates nothing that could otherwise explain the contemporaneous appearance of $CaCO_3$ and NH_3 on boiling.

It therefore only remains for us to discuss the question whether the carbamate found by us may not be an artificial product, the result of the various manœuvres employed in its isolation. Every normal urine contains small quantities of CO_2* either in the free state or in combination, as well as salts of ammonia from which the ammonia is set free when the urine is shaken with milk of lime, and hence it might be inferred that we really have all the conditions for the artificial formation of carbamic acid. Drechsel† has demonstrated in his research on the oxidation of glycocoll, leucin and tyrosin that carbamic acid is formed wherever CO_2 and NH_3 meet in the nascent condition. But the circumstances in the two experiments differ widely, for the addition of an excess of milk of lime to the urine binds the small amount of CO_2 that is present at the same time that it liberates the NH_3; certainly these chemical conditions cannot be likened to those met with in the oxidation experiments just referred to, in which compounds containing nitrogen and carbon are oxidized in alkaline solutions, and in which nascent NH_3 and CO_2 are able to act on each other. They differ, too, from those obtaining in the ordinary method of preparing calcium carbamate, namely, the passing of a continuous current of CO_2 into a concentrated solution of ammonia holding milk of lime in suspension. The opinion that the calcium carbamate found by us is not an artificial compound produced in the course of our manipulations, but that it is excreted as such by the kidneys, also receives support from the following experiment. A liter and a half of human urine of acid reaction was treated in the manner already described for the isolation of carbamic acid. The final product was dissolved in water, filtered into a test-tube and boiled; a little calcium carbonate was deposited, but no ammonia was given off. The urine in question, therefore, contained no carbamic acid and the manipulations employed

* Archiv f. experimentelle Pathologie und Pharmakologie, Bd. 32, pp. 198-9.

†Abel u. Muirhead: Archiv f. exp. Pathol. u. Pharmakol., Bd. 31, pp 21-3; Drechsel u. Abel: Archiv f. (Anat. u.) Physiologie, 1891, pp. 240-2. See also Hahn, Massen, v. Nencki and Pawlow in Archiv f. exp. Pathol. u. Pharmakol., Bd. 32, pp. 197-200, or Archives des Sciences Biologiques, St. Pétersbourg, t. I, no. 4, pp. 401-95.

* Pflüger's Archiv, Bd. II., p. 156, and Bd. VI., p. 93.

† Journal f. prakt. Chemie (2), Bd. XII., p. 422.

in its isolation are not capable of causing its appearance. It is not to be inferred, however, that an acid urine cannot contain carbamic acid. Nencki and Hahn* have met with it in an acid urine of the horse.

It will be remembered that we occasionally found small quantities of free ammonia in the urine of dogs fed on the ordinary refuse of the butchers' shops even when no lime had been mixed with their food. It seemed worth while also to isolate the carbamic acid from such urines. The yield was far less than when lime was mixed with the food, the final product† isolated from the former urines furnishing only $\frac{1}{5}$ as much calcium carbamate as the latter.

Do the experiments that we have detailed apply to human urine? We are prepared to think that they do, and we are confident that all cases of persistent and marked alkalinity of the urine due to long administration of much lime water will be found on examination to be instances of ammoniacal urine due to the presence of a salt of carbamic acid. We were allowed through the kindness of a friend to try the following experiment. A four-year-old boy was given two teaspoonsful a day of very thick cream of lime well distributed in his milk and other food. No digestive disturbances were observed to follow the administration of this quantity of lime but on the evening of the third day the child's urine exhibited all the characteristic reactions of a dilute solution of calcium carbamate. It goes without saying that the administration of lime water even in large quantities would have required a much longer time to produce a like effect.

This case together with the one cited at the opening of this paper suffice to show that so simple a drug as lime-water may cause hitherto unsuspected changes in the urine. Whether the ammonia that is given off by these urines may give rise to any clinical symptoms, such as an increased irritability of the bladder, we are not yet able to say.

In concluding this part of the subject I may be permitted for the sake of clearness to give a brief resumé of the results.

1. The urine of dogs fed on meat becomes strongly alkaline when slaked lime is mixed with the food, and gives off ammonia and carbon dioxide spontaneously.

2. It contains absolutely less ammonia in the 24 hours than normal urine.

3. It always contains a calcium salt in solution which is not bicarbonate of calcium, and which decomposes with precipitation of calcium carbonate if the urine be allowed to stand.

4. The lime urine exhibits all the characteristics of a weak aqueous solution of calcium carbamate, and a white powder may be isolated from it which behaves in every way like synthetically prepared calcium carbamate, except that it gives less accurate results on being subjected to quantitative analysis.

5. Human urine behaves exactly like that of the dog when large quantities of lime have been taken and it likewise contains calcium carbamate.

Why carbamic acid should appear in such noticeable quantities after the administration of lime we can only surmise. It seems plausible to argue that the body avails itself of its readily soluble calcium salt to get rid of the excess of calcium that has been absorbed. That calcium is absorbed in not inconsiderable quantities has been repeatedly demonstrated, and that there are in the urine but few acids that can form soluble calcium compounds is apparent, but in the present state of our knowledge we can furnish no adequate explanation for the appearance of this acid under the circumstances described in this paper.

The fact that carbamic acid is an important intermediate product of the metabolism of the body gives to its appearance in the urine a more than merely clinical or pharmacological importance. Recent researches have made it more than probable that it is the chief immediate precursor of urea, and that it therefore plays a great part in the complicated chemical processes to which the proteids of our food are subjected before their nitrogen is eliminated in the urine.

As no other theory of the formation of urea in the body has as good an experimental foundation as this, which I may call the carbamic acid theory, I shall confine myself to a short account of the experimental work that has established this theory in its present position. Twenty-five years ago Schultzen and Nencki* instituted a series of feeding experiments in order to learn whether the amido acids such as glycocoll, leucin and tyrosin, which are always to be found among the decomposition products of proteids and proteid-like bodies when they are subjected to hydrolytic decomposition,† had any connection with the formation of urea. They found that the nitrogen of these amido-acids, especially of glycocoll and leucin, reappeared in the urine in the form of urea, and this observation first suggested that carbamic acid is formed in the economy as an intermediate product in the course of their oxidation to urea. Salkowski next demonstrated‡ that when taurin is given to human beings it reappears to some extent in the urine as a salt of an acid called by him tauro-carbamic, but more properly named uramido-isæthionic acid, since its formula obliges us to look upon it as one of the uramido-acids, in other words, as a substituted urea.

Thus, $\begin{vmatrix} CH_2.NH(CONH_2) \\ CH_2.SO_2H \end{vmatrix}$ = amido-isæthionic acid. The formation of this compound in the body must, however, be looked upon as supporting the opinion that carbamic acid really exists in the economy, and that it can combine with certain compounds that have been introduced.

Schultzen's§ experiments in 1872 on the fate of sarkosin in the organism of the dog, which were for a long time looked upon as having furnished strong probable evidence or even proof that certain amido-acids play an important rôle as precursors of urea, were afterward shown by Baumann,

*See Hahn, Massen, v. Nencki and Pawlow, Archiv f. exp. Pathol. u. Pharmakol., Bd. XXXII., p. 200.

†Abel and Muirhead, *loc. cit.*, p. 23.

*Berichte d. deutsch. chem. Gesell., 1869, p. 566–71, and Zeitschr. f. Biolog., Bd. 8, p. 124.

†Tyrosin is not found among the decomposition products of the glutinoids, and glycocoll, which is regularly found among the decomposition products of gelatin, is not found among those of the proteids proper.

‡Berichte d. deutsch. chem. Gesellsch., 1873, 6, pp. 744–6, pp. 1191–3 and 1312.

§Ber. d. deutsch. chem. Gesellsch. 1872 (5), pp. 578–81.

v. Mering,* Salkowski† and Schiffer‡ to be far from conclusive for this theory.

A perusal of the papers of the investigators just named, especially of the historical introduction to Schiffer's paper, will give an idea of the interest aroused by Schultzen and Nencki's work, and of the laborious researches that have since been devoted to the fate in the body of various amido-compounds, researches which, it was hoped, would throw light on the formation of urea in the body.

The result of all this work on the amido-acids was that the carbamic acid origin of urea could not be accepted as demonstrated. But meanwhile (1875) appeared Drechsel's§ notable paper already referred to, on the oxidation of glycocoll, leucin and tyrosin, and on the occurrence of carbamic acid in the blood. Drechsel demonstrated that when these compounds are oxidized in ammoniacal solution with ammonium permanganate, carbamic acid is always to be found among the oxidation products. Urea is not formed. Aqueous solutions of glycocoll oxidized with potassium permanganate also yield carbamic acid, and it is thus demonstrated that carbamic acid can be produced when there is no ammonia originally present. Otherwise it might have remained an open question whether the carbamic acid formed in the ammoniacal solutions of the first experiments was not the result of the interaction of nascent CO_2 with the ammonia originally present. In this paper Drechsel also furnished proof of the existence of a salt of carbamic acid in the blood of the dog. These results both chemical and physiological were challenged by Hofmeister,‖ who claimed to have demonstrated that the reactions obtained by Drechsel were to be referred to other substances than carbamic acid—the presence of unprecipitated calcium carbonate, oxaminic acid, etc. Drechsel** afterward repeated with great care those parts of the research upon which doubt had been thrown, and demonstrated to the satisfaction of workers in this field that his original position was well taken. Some years later Drechsel†† again made an important experimental contribution to this subject by effecting the dehydration of ammonium carbamate to urea in an aqueous solution by means of a rapidly interrupted electric current, thus imitating the conditions under which urea is formed in the human body more closely than when its precursors are heated to high temperature in sealed tubes, etc. The formation of urea by this electrolytic method is the result of an alternate oxidation and reduction. Now the living protoplasm of the body cells is endowed with oxidizing and reducing powers, and although the exact chemical explanation of these processes is not at hand, we have only to assume that these powers are in some instances exercised in an alternating manner to give Drechsel's experiments a wide application.

From our present knowledge of the locality in which urea is mainly formed, thanks to the brilliant experimental researches of W. von Schröder,* we may think of the liver cell as exercising an oxidizing and reducing action on the carbamate of ammonia, with the resulting formation of urea. These processes may be expressed in the following terms:

I. $NH_2.CO.O.NH_4 + O = NH_2.CO.O.NH_2 + H_2O.$
II. $NH_2.CO.O.NH_2 + H_2 = NH_2.CO.NH_2 + H_2O.$

With the help of this principle of an alternating oxidation and reduction, first definitely stated and copiously illustrated by Drechsel, many of the hitherto inexplicable chemical phenomena of the body become clear to us. Such are the many synthetic processes accompanied by water abstraction and the reductions that so frequently interrupt the step-by-step oxidations that are continually going on, and which lead to the formation of a large number of interesting intermediate products.†

Further experimental evidence of the existence of carbamic acid in the economy was furnished by Drechsel and Abel in their discovery of its occurrence as a normal product in the urine of the horse. The very interesting and novel experiments recently performed by Hahn, Massen, v. Nencki and Pawlow‡ have shown most convincingly that this acid has the importance that has for some time been attributed to it as an intermediate product in the breaking down of proteids within the body. These experimenters performed v. Eck's operation on dogs, that is, they tied the portal vein close to its entrance into the liver and established a free communication between this vessel and the inferior vena cava, so that all the blood from the portal district passed directly into the inferior vena cava and was entirely excluded from the liver. I must refer to the original treatise for the details of the operation, for the variations in the experiment, such as the partial or total resection of the liver, ligature of the hepatic artery in addition to the establishment of Eck's fistula, and for the details of the large amount of chemical work contained in this valuable contribution. After a variable period of time the animals thus operated upon manifested grave symptoms referable to the nervous system. There appeared a stage of somnolence with ataxia, followed by one of excitation with ataxy, analgesia and amaurosis, this again passing into a stage of clonic and tetanic convulsions, which were followed by coma sometimes terminating fatally. Chemical analyses demonstrated the presence of ammonium carbamate in largely increased quantity in both the blood and urine of those animals that had

* Berichte d. deutsch. chem. Gesellsch. 1875 (8), pp. 584–9.

† Zt. f. physiol. Chemie, Bd. IV., pp. 55–85, and pp. 100–33; also Ber. d. d. chem. Gesell. 1875, Bd. 8, pp. 638–40.

‡ *Ibid.* Bd. V., pp. 257–66, and Bd. VII., pp. 479–87.

§ *Loc. cit.* pp. 417–26.

‖ Journal f. prakt. Chemie (2), Bd. XIV., pp. 173–83, and Pflüger's Archiv, Bd. XII., p. 337.

** Journal f prakt. Chemie (2), Bd. XVI., p. 169. See also D.'s important paper on the preparation and description of a number of new salts of carbamic acid, *ibid.* pp. 180–200, for valuable points bearing on the properties of carbamic acid, and notably of its calcium salt.

†† Journal f. prakt. Chemie (2), Bd. XXII., pp. 476–88; Archiv f. (Anat. u.) Physiol., 1880, p. 550.

* Archiv f. exp. Pathol. u. Pharmakol., Bd. XV., pp. 364–402, and *ibid.* Bd. XIX., pp. 373–86.

† Drechsel, Archiv f. (Anat. u.) Physiol. 1891, pp. 251–4. Nencki, Archiv f. exp. Pathol. u. Pharmakol., Bd. 32, p. 206. Baumann, Zeitschrift f. phys. Chem., Bd. XV., pp. 276–7.

‡ Archives des Sciences Biologiques, t. I., no. 4, pp. 401–07, and Archiv f. exp. Path. und Pharmak., Bd. 32, pp. 161–211.

FIG. 1.

a shows the tumor in the vault of the vagina below and posterior to the urethra.

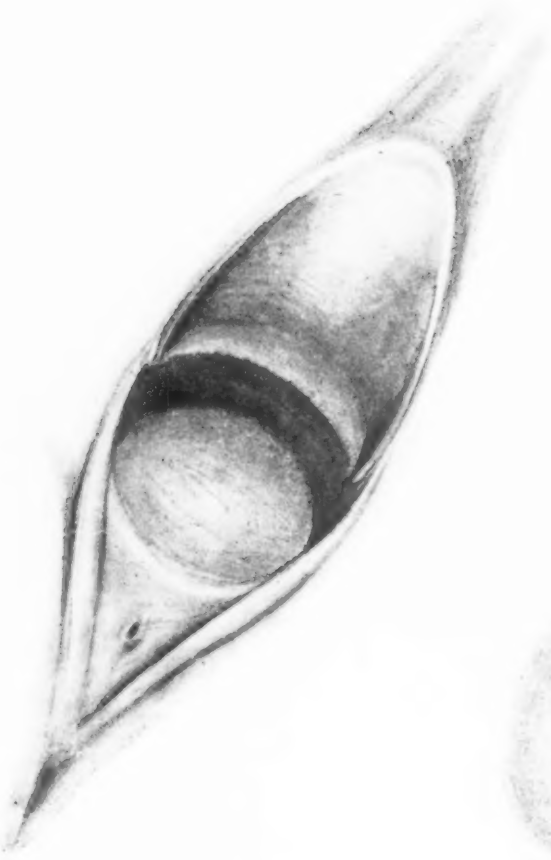

FIG. 5.

View of tumor with the patient in left lateral position.

FIG. 6.

Actual size of tumor.

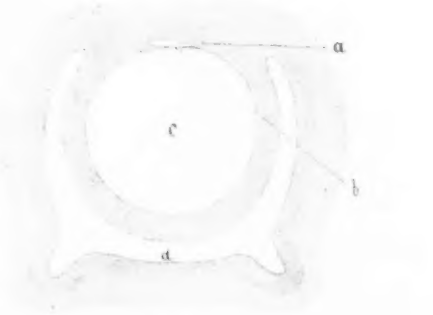

FIG. 3.

Cross Section.—*a* represents the urethra; *b* the opening between urethra and sac; *c* the sac; *d* the vagina.

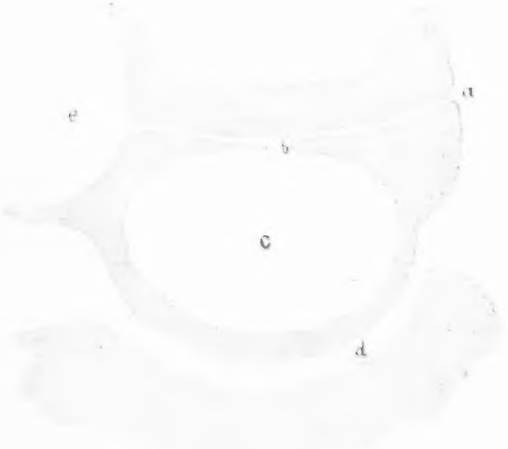

FIG. 2.

Longitudinal Section. *a* represents the urethra; *b* the opening between urethra and sac; *c* the sac; *d* the vagina, which is encroached upon and thus appears very flat; *e* the bladder.

FIG. 4.

Shows the opening in the floor of the urethra as viewed through the urethral speculum.

the nervous seizures just referred to. Pharmacological experiments also demonstrated a very satisfactory agreement in the symptoms of these nervous seizures resulting from the establishment of an Eck's fistula, with those observed in healthy dogs after the intravenous injection of very large doses of sodium carbamate (0.3–0.6 gram pro kilo). A differential test of great value is seen in the fact that a healthy animal is not poisoned by the administration of large doses of sodium carbamate by the mouth after previous neutralization of the hydrochloric acid of the stomach, whereas an animal that has been operated upon responds at once to this method of administration with the severe symptoms already referred to. It is evident, then, that in this latter case the greatly damaged liver is no longer able to convert with sufficient rapidity the carbamic acid absorbed from the digestive tract into the harmless urea. Meat-eating has for dogs with an Eck's fistula the same consequences as the administration of a carbamate by the mouth. Interpreting their experiments in the light of previous knowledge as to the occurrence of carbamic acid and as to the functions of the liver in the synthesis of urea, Hahn, Massen, v. Nencki and Pawlow conclude that ammonium carbamate is formed everywhere in the tissues as the final stage of the decomposition of proteids and that it is carried to the liver and there converted into urea.

It would take us beyond the scope of this paper to discuss the chemical processes antecedent to the appearance of carbamic acid in the tissues, or how much urea is formed in other ways than by passing through the carbamic acid stage, or to raise the question as to the bearings upon the carbamic acid theory of the increased excretion of ammonia that has been observed in the terminal stages of hepatic cirrhosis, diabetes mellitus, etc. When it is borne in mind that carbamic acid makes its appearance whenever nitrogenous principles such as occur in the body are oxidized in alkaline media, that its salts occur in the blood and urine of animals and in the urine of human beings, that it can be converted into urea in the laboratory by simple chemical processes not foreign to the body, that it will yield urea if it be conducted through a "surviving" liver, and that it appears in increased quantity in the blood and urine under experimental conditions in which the functions of the liver have been deranged, it will be admitted that we have good reasons for believing that it bears an important relation to urea, and that its study in normal and pathological conditions must be of interest and value.

ABSCESS (?) IN THE URETHRO-VAGINAL SEPTUM.

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[*Read before the Johns Hopkins Medical Society, February* 19, 1894.]

This case of Dr. Kelly's entered the Hospital, January 16, 1894. Is colored, aged 31, married, has no children, and is a hard worker, general health good. Immediately after marriage she complained of painful coitus. Four years ago she noticed a small lump about 2 cm. in diameter in the vault of the vagina. At first it was very soft and tender but afterward grew hard. She noticed an occasional slight discharge of pus from the urethra during the intervals between micturition. Examination of the chest and abdomen proved negative. Under anæsthesia an ovoid mass 3x2½ cm. was found in the anterior vault of the vagina, pressure on which caused an escape of pus from the urethra. On passing the speculum into the bladder the base was found markedly injected. Withdrawing the speculum slightly, a little depression was seen in the urethral floor, and a probe passed into this depression entered a small sac. On pressing the sac and looking in the speculum one could see the pus oozing up from this depression in the urethral floor. The patient was placed in the left lateral position to secure a good exposure. A small elliptical incision was made over tumor and the parts dissected back to the urethra, the sac cut away and the opening closed by 10 silk sutures, which were removed in 11 days; the union was perfect. The patient was discharged February 16th.

Microscopical Examination of the Sac.

The outer surface of the sac showed typical vaginal mucous membrane; beneath this was connective tissue, rich in oval and spindle-shaped cells. The blood-vessels were numerous and dilated. Just beneath the inner wall of the sac were irregular aggregations of polynuclear leucocytes in the tissue. The inner surface was rough and presented numerous elevations and depressions. In some of these depressions irregularly oval cells with small oval nuclei were found either in short rows or arranged promiscuously. These appeared to be identical with urethral epithelium, thus indicating that the sac was a urethral diverticulum.

Very little is said in text-books concerning this subject, and in fact the majority do not mention it. Hey,[16] in his Surgery, published in Philadelphia in 1805, mentions a case which he treated in 1786. A woman for 15 years had sudden and irregular purulent discharges from the urethra. These were never mixed with urine. Examination revealed a roundish tumor at the external os. On pressing this, pure pus escaped from the urethra, yet urine drawn from the bladder did not contain the least purulent matter. A probe introduced into the urethra could be pushed into the most dependent part of the tumor. The tumor was longitudinally incised and packed with lint. Its vaginal covering was found to be thickened and the cyst-lining was smooth. The patient speedily recovered. From this time until Foucher[9] reported a case, in 1857, no further cases can be found in the literature. In 1875 Tait[40] published a case, closely followed by Gillette, in 1876.[14] Since then scattered cases have been published in France, Germany, Great Britain and America.

Symptoms.

The first symptom manifested is usually painful micturition,

which gradually increases in severity after a period varying from a few days (de Bary[1]) to several months (Hermann[18]). There is marked pain during micturition, followed by a sudden discharge of ammoniacal urine or pus which gives immediate relief. About this time a swelling is noticed in the vaginal vault. It is usually situated in the mid-line about 1 to 2 cm. behind the external orifice of the urethra. The tumor varies in size from a marble (Routh[34]) to a hen's egg (Tait[41]), is tender and fluctuant. On pressure it diminishes in size, and discharge of ammoniacal urine or pus from the urethra follows. A catheter introduced along the anterior wall of the urethra will enter the bladder without difficulty, and usually clear urine escapes. If introduced along the urethral floor with its point directed downward it will enter the sac cavity. The patients are usually in good health and give no history of chills.

On changing from a sitting to a standing posture there will often be an escape of the sac contents, the first intimation to the patient being that the clothing is moist. Coition may also cause a discharge of the fluid (Giraud[15]). In one case (Santesson[33]), on pressure the contents escaped into the bladder instead of passing out of the urethra. Where the discharge is irritating there is excoriation of the external genitals and thighs. The sac opening in the urethra will admit as a rule a No. 6 catheter. The sac may have smooth glistening walls (Hey[16]), be lined by squamous epithelium (de Bary[1]), or have a ragged appearance with trabeculæ traversing its cavity (Routh[34]). Its contents are usually decomposed urine and pus cells, and where the sac contains calculi, blood cells are also found (Chéron[4] and Giraud[15]). In one of the cases where calculi were present the interior of the sac presented an ulcer at its most dependent part, which was probably due to mechanical injury produced by the calculus.

Age.—This condition has been found in a child one year old (de Bary[1]), and may occur in persons of any age (Chéron[4]); the usual age, however, is between 30 and 50.

Cause.—In speaking of the origin of these sacs it will be well to briefly run over the anatomy of the structures situated in the urethro-vaginal septum and also to describe the urethra.

In the urethro-vaginal septum there may be remains of Gartner's ducts as first described by Malpighi[27] in 1681, and again discovered by Gartner[11] in 1822. The latter first noticed them while injecting the lymph vessels in a cow. He was able to trace the duct upward nearly to the ovary, downward to the cervix uteri, and in later preparations found them opening into the vagina near the urethral orifice. He also found them in the pig. He compared this duct to the vas deferens in the male.

Jacobson[19] in 1830 obtained similar results, but described the ducts somewhat more minutely. Rieder[29] examined specimens from 40 human beings, and found remains of the ducts in 8 cases. He concludes that portions of the duct which remain until birth will persist throughout life. He agrees with Dohrn[6] that the duct is more commonly found on the right side, the left being obliterated by rectal pressure. At the lower part of the cervix uteri the duct is near the uterine lumen, then passes downward and outward over the vaginal vault close beneath the mucous membrane. He was never able to trace it to the sides of the urethra. The duct is lined by high cylindrical epithelium, which is loosely attached to its basement membrane, and may lie free in the lumen of the tube. It may, however, have two layers of cells. The connective tissue layer is about 17 μ thick. Then comes an inner longitudinal, a median circular and an outer longitudinal muscular coat.

Von Preuschen[31] found the ducts in a cat opening slightly above the urethral orifice. They were lined by cylindrical epithelium.

The urethra is lined by laminated epithelium and contains racemose glands and lacunæ.

Henle[17] in his text-book speaks of Morgagni's lacunæ as furrows and pockets of mucous membrane, and mentions branching glands lined by cylindrical epithelium. These glands sometimes contain yellow or brown laminated concretions like those found in the prostates of men.

Luschká[26] also speaks of lacunæ and glands. He says the lacunæ are "canal-like" and that they run in the direction of the urethra and are visible from without.

Oberdiech,[29] in examining the epithelium of the female urethra, also makes a distinction between the lacunæ and glands.

Lastly, Skene's[39] tubules, which have since been described by Schüller,[36] Kock[23] and Böhm,[3] the two latter saying that they are remains of Gartner's duct. These tubules are situated just within the urethral orifice on either side; they admit a probe 1 mm. in diameter for 5 to 10 mm.

The possible causes are:

1. Congenital cysts or those occurring in the new-born. The latter variety has been mentioned by Englisch,[8] who found that in new-born children, small oblong cysts are occasionally present in the urethra near its orifice. He suggests that these may in after life increase in size and give rise to the above condition.

2. A true urethral diverticulum where all the urethral coats take part. This is due to the wall becoming weak at one point (Lannelongue,[24] Priestley[32]).

3. Accumulation of secretions in a urethral gland.

4. Dilatation of a lacuna of Morgagni probably due to inflammation, closure of its orifice, and subsequent distension with secretion (Winckel[44]).

5. Dilatation and possible occlusion of Skene's tubules (Böhm[3]).

6. Arrest of calculi in the urethra, with a diverticulum forming to accommodate the same (Chéron,[4] Piedpremier[30]).

7. Traumatism, as a kick, or injuries during labor. Here an abrasion of the mucous membrane takes place and the urine gains access to the small pocket, decomposes and sets up an inflammatory process (Duplay[7]).

8. A suppurating cyst situated in the urethro-vaginal septum and afterward bursting into the urethra (Hermann[18]).

It is not difficult as a rule to differentiate between sac-like dilatations in the urethral floor and cysts of Gartner's duct. The latter cysts are generally about the size of a pea or cherry and have no communication with the urethra. Kiwisch[22] found five such cysts, one behind the other, and Boys de Loury[25] has seen a beaded row extending the whole length of the vagina. Veit[43] observed three similar cases which he accidentally noticed while making examinations.

Galabin's[10] second case is interesting in that the cyst had no opening into the urethra, but communicated with a tube running up as far as the cervix. This tube contained a watery and semi-purulent fluid.

A second and similar case has been reported by de Bary,[1] in which a cyst the size of a goose-egg was found in the urethro-vaginal septum. It contained a fluid which yielded albumen but no mucin. It was lined by polygonal flat epithelium. Both of these cases suggest the possibility of a cyst of the lower portion of Gartner's duct.

The *treatment* consists in the removal of the redundant tissue *in toto* by an elliptical incision, then a slight inversion of the mucous membrane and closure by silk sutures. The catheter should be passed three times daily for 3 to 4 days, and the patient should afterwards be advised to urinate in the genu-pectoral position for a week longer. In introducing the catheter, care should be taken to pass it along the anterior urethral wall.

Below is a list of the cases found in the current literature.

Literature.

1. de Bary: Ueber zwei Fälle von Cysten in der Wand der weiblichen Harnröhre. Arch. f. path. Anat., Bd. 106, S. 65.
2. Batuard: Piedpremier, Paris. Thèses, 1887–8. Contribution à l'étude des maladies de l'urèthre.
3. Böhm: Ueber Erkrankungen der Gartner'schen Gänge. Archiv für Gyn., Bd. XXI, Heft 1, S. 176.
4. Chéron: Piedpremier, Paris. Thèses, 1887–8. Contribution à l'étude des maladies de l'urèthre.
5. Cory: Abscess of female urethra. London Obst. Trans., Vol. XI, 1869.
6. Dohrn: Archiv f. Gyn., Bd. XXI, 1883, S. 328. Ueber die Gartner'schen Kanäle beim Weibe.
7. Duplay: Pouches urineuses. Archiv Génerales de Médecine, no. 146, 1880, p. 12.
8. Englisch: Wiener medizinische Presse, 1881, Bd. XXII, S. 599–634. Ein Fall von einer Cyste in der Wand der weiblichen Harnröhre.
9. Foucher: Winckel, in Billroth und Leucke: Handbuch der Frauenkrankheiten, Vol. III, S. 362. "Diverticulum of the urethra in the female."
10. Galabin: Chronic abscess of the female urethra. London Obst. Transactions, Vol. XXVIII, 1886, p. 186.
11. Gartner: Kongl. Dancke. Vetersk. Lebsk. Skrift, 1822. Nach Karl Rieder: Ueber Gartner'schen Kanäle beim menschlichen Weibe. Archiv für path. Anat., Bd. 96, S. 100.
12. Gentle: Piedpremier, Paris. Thèses, 1887–8. Contribution à l'étude des maladies de l'urèthre.
13. Gervis: Chronic abscess of the female urethra. Lond. Obst. Trans., XXVIII, 1886, p. 186.
14. M. Gillette: Vaginal urethrocele. Lancet, 1876, p. 663.
15. Giraud: Piedpremier, Paris. Thèses, 1887–8. Contribution à l'étude des maladies de l'urèthre.
16. Hey: Collections of pus in the vagina. Hey's Surgery, Phila., 1805, p. 303.
17. Henle: Handbuch d. systemat. Anat. des Menschen, II, 1866, S. 334.
18. Hermann: A case of chronic abscess of the female urethra. Lond. Obst. Trans., XXVIII, 1886.
19. Heyder: Beiträge zur Chirurgie der weiblichen Harnorgane. Archiv für Gynäkologie, Bd. XXXVIII, Heft 2.
20. Jacobson: Die Oken'schen Körper, Kopenhagen, 1830. Nach Rieder, Arch. f. path. Anat., Bd. 96, S. 102.
21. Jones (Handfield): Chronic abscess of the female urethra. Lond. Obst. Trans., XXVIII, 1886, p. 187.
22. Skene Keith: A case of thickening and dilatation into a pouch of the female urethra. Edinburgh Obst. Trans., Vol. X, p. 151.
23. Kiwisch: Ueber die Cysten der Vagina. G. Veit, Handbuch der weiblichen Geschlechtsorgane, 2. Auf. 1837, S. 544.
24. Kock: Ueber die Gartner'schen Gänge beim Weibe. Arch. f. Gynäkologie, Bd. XX, 1883, S. 487.
25. Lannelongue: Piedpremier, Paris. Thèses, 1887–8. Contribution à l'étude des maladies de l'urèthre.
26. Boys de Loury: Ueber die Cysten der Vagina. G. Veit: Handbuch der weiblichen Geschlechtsorgane, 2. Auf. 1867, S. 544.
27. Luschká: Die Anatomie des Menschen, II, 2, 1864.
28. Malpighi: Ueber Gartner'schen Kanäle beim menschlichen Weibe. Carl Rieder: Archiv f. path. Anat., Bd. 96, S. 100.
29. Newman: Urethrocele in the female. Am. Journal Obst., 1880.
30. Oberdieck: Ueber Epithel. und Drüsen der Harnblase und weibl. und männl. Urethra. Preisschrift, Göttingen, 1884.
31. Piedpremier: Paris. Thèses, 1887–8. Contribution à l'étude des maladies de l'urèthre.
32. Von Preuschen: Ueber die Gartner'schen Gänge. Arch. f. path. Anat., Bd. 70, 1877.
33. Priestley: Cysts of the urethra. British Med. Journal, 1869, Vol. 1, p. 6.
34. Rieder: Ueber die Gartner'schen (Wolff'schen) Kanäle beim menschlichen Weibe. Archiv f. path. Anat., Bd. 96, S. 100.
35. Routh: Urethral diverticula. Lond. Obst. Trans., Vol. XXXII, 1890, p. 69.
36. Santesson: Nordiskt. Med. Archiv, Vol. XVI, 1884. Nach Schmidt's Jahrbücher, CCIII, Part IX, 479.
37. Schüller: Ein Beitrag zur Anatomie der weiblichen Harnröhre. Festschrift, Berlin, 1883.
38. Simon: Piedpremier, Paris. Thèses, 1887–8. Contribution à l'étude des maladies de l'urèthre.
39. Skene: Diseases of the bladder and urethra in women. 1878, p. 317.
40. Skene: Diseases of women. 1889, p. 614.
41. Tait: Saccular dilatation of the urethra. Lancet, 1875, Vol. 2, p. 625.
42. Tait: Saccular dilatation of the urethra. British Med. Journal, 1885, Vol. 1, p. 982.
43. Thomas: Urethrocele of large size. New York Med. Journal and Obst. Review, 1882, p. 527.
44. G. Veit: Ueber die Cysten der Vagina. Handbuch der weiblichen Geschlechtsorgane, 2. Aufl., 1867, S. 544.
45. Winckel: Urethral diverticuli. In Billroth u. Luecke: Handbuch der Frauenkrankheiten, Vol. III, 363.

Table of Sacs Found in Urethro-vaginal Septum.

Reported by	Age.	Married or Single.	Chief Symptoms.	Duration.	Cause.	Operation.	Complications.	Result.
de Bary.	1		Bearing-down sensation at stool. Painful micturition. Small tumor in left vaginal vault just behind urethral orifice. Sac opened into urethra.			Removal of portion of sac wall with ecraseur.		Rapid recovery.

Reported by	Age.	Married or Single.	Chief Symptoms.	Duration.	Cause.	Operation.	Complications.	Result.
de Bary.	23	S.	Inmate of an asylum. Specimen found at autopsy.					
Batuard.	33	M.	Tumor size of a "nut" in ant. vaginal vault. Pressure over it caused escape of pus from the urethra.			Sac incised.	Prolapsus uteri. After operation incontinence of urine for 15 days.	Cured.
Chéron.	68	M.	(Renal colic three years before history was taken.) "Sand in urine." Hard mass felt in ant. vaginal wall, which, on passage of catheter into urethra, proved to be a stone embedded in a sacculation of the urethra.			Dilatation of urethra. Extraction of calculus.		
Chéron.	36		Two years before examination passed "sand" in urine. Painful micturition; small tumor in vaginal vault. Sac communicated with urethra and contained a small calculus.		Thinks it developed in a lacuna.	Not given.		Sac disappeared 4 months after operation.
de Cory.	40	M.	Painful micturition. Feeling of fulness in "lower abdomen." Great thirst and headache. Vagina hot and tender. Urethra felt like a large *roll* under finger. Slight fluctuation.			None. While at stool, felt something rupture and pus escaped from the urethra.		Wound healed completely.
Duplay.	23	M.	Painful micturition. Sudden involuntary discharge of small quantities of urine. Tumor size of walnut in ant. vaginal vault, fluctuant and tender. Pressure over it caused muco-pus to escape from the urethra.			Sac opened by thermo-cautery and packed with iodoform gauze.		Cured in 3 months.
Englisch.	35	M.	Painful micturition. Tumor in right vaginal vault, tense and fluctuant. *Did not communicate with urethra.*			Was opened throughout its entire length and packed with gauze.		Cured.
Foucher.	35	M.	Painful micturition. Tumor in right vaginal vault. This was tense and fluctuant (did not communicate with urethra).			Was opened from end to end and packed with gauze.		Cured.
Galabin.			"Swelling" in ant. vaginal wall, filled with purulent fluid and communicating with urethra.			Redundant tissue cut away and wound closed by sutures.		
Galabin.			Cavity in urethro-vaginal septum, communicating with a *tube* running upward toward the cervix and filled with semi-purulent contents. Did not communicate with the urethra.					
Gentle.	40		Painful micturition, the stream being forked or screw-like, with occasional sudden stoppage of flow. Afterward localized pain in the urethra. Tumor in vaginal vault. Catheter introduced into urethra entered sac easily and struck a calculus.			Incision in vaginal vault and removal of calculus.		Rapid recovery.
Gervis (1886).			Painful micturition. Pain referred to vagina.			None. Broke spontaneously into urethra.		Cured.
Gillette (1876).	31	M.	Painful micturition. Sudden discharge of urine on standing or during coition. Ovoid mass 4½x3 cm. in ant. vag. wall just behind meatus, communicating with floor of urethra.	1 year.		Redundant tissue cut away and wound closed by sutures.		Cured.

Reported by	Age.	Married or Single.	Chief Symptoms.	Duration.	Cause.	Operation.	Complications.	Result.
Giraud.	45	M.	Pain in "lower abdomen," especially during coition or when standing. Hard, reddish tumor, size of hen's egg, in vaginal vault. On pressure, foreign bodies felt in its interior. Communicated with floor of urethra.	10 months.	Had been kicked in perineal region 14 months before.	Urethra dilated and calculi removed.		Cured.
Hey (1786).			Irreg. purulent discharge from vagina. Roundish tumor at ext. os uteri. Pressure on tumor caused escape of pus from urethra. Urine clear.	15 years.		Sac longitudinally incised and packed with lint.		Cured.
Hermann.	47	M.	Painful micturition and coition. Tender swelling in ant. vag. vault, which communicated with urethra and contained pus.	3 years.		Dilatation of urethra. Appl. of $AgNO_3$ (stick).		Cured.
Heyder (1889).	31	M.	Pain in urethra. Painful micturition. Involuntary escape of small quantities of urine.	Several months.	Occurred after a difficult labor.	Sac excised.	None.	Cured.
Jones, H.			Painful micturition. Tumor size of hazelnut in ant. vag. vault. Slight discharge of pus from urethra.					Spontaneous recovery.
Keith, S.	44	M.	Frequent micturition. Bulging of ant. vag. wall. Pressure on same caused escape of pus from urethra.			Sac was incised and urethra and vaginal mucous membranes united to each other to insure drainage.		Wound closed in 4 months.
Kelly, H. A. (1894).	31	M.	Painful coition. Painful and frequent micturition. Swelling 3x2.5 cm. in vaginal vault just behind urethral orifice and communicating with floor of urethra. Contained thin pus. Only moderate number of polynuclear leucocytes.	4 years.		1. Elliptical incision over tumor. 2. Tumor dissected out to its connection with urethra and removed. 3. Wound closed by 10 silk sutures.		Stitches removed in 10 days. Union complete.
Lannelongue.	11	S.	Small tumor in vault of vagina. Some involuntary discharge of urine.			Several linear scars made over sac with thermocautery to diminish sac.		Unsuccessful.
Newman.	85		Tenesmus. Slight incontinence of urine. Small tumor in vaginal vault, which communicated with urethra.			Dilatation of urethra and irrigation.		Reported well in 2 months.
Piedpremier.	55	M.	Painful coition. Slight involuntary discharge of urine. Tumor in vaginal vault size of "nut." Slight discharge of pus from urethra on pressure over sac.			Tumor incised *per vaginam* and rubber tube introduced.		Cured.
Priestley.*								Only palliative treatment allowed.
Priestley.*								
Routh.	33	M.	Painful micturition. Tumor size of marble in vaginal vault, communicating with floor of urethra.			Sac dissected out and wound closed by sutures.		Wound healed in seven days. Cured.
Routh.	60	M.	Painful micturition. Sac size of walnut in vaginal vault. Contained thin offensive pus and had two openings into urethra.			Sac excised and wound closed.		Small opening remained in lower angle of wound. Cured.
Routh.	27	M.	Tender swelling in vaginal vault. Pressure caused discharge of irritating fluid from urethra.	1 month.		Portion of sac removed and patient advised to urinate in genu-pectoral position.		Wound healed in 20 days. Cured.

* No details given.

Reported by	Age.	Married or Single.	Chief Symptoms.	Duration.	Cause.	Operation.	Complications.	Result.
Santesson.		M.	Painful micturition. Pruritus and fulness in ant. vag. vault. Pressure over ant. vag. vault caused escape of contents into bladder.	12 years.	Birth of child.	Removal of elliptical piece of sac wall.	Sloughing of part of sac wall.	Cured. Died 5 years later of nephritis.
Simons.	44	M.	Involuntary passage of urine on excessive exercise. Tumor size of hen's egg in vaginal vault.			Several veins ligated. Sac cauterized with zinc.		Cured.
Skene.			Sac in urethro-vag. septum communicating with urethra.					
Tait (1875).			Sac size of hen's egg in vault of vagina. Pressure caused escape of ammoniacal urine from urethra.			Sac cut away and wound closed by sutures.		
Tait.	23		Swelling in vaginal vault. Painful micturition followed by escape of pus from urethra. All communicated with floor of urethra.			Sacs dissected out and wounds closed with silver wire.		All left hospital cured within 20 days.
Tait.	52							
Tait.	32							
Thomas.			Frequent and painful micturition. Tumor size of hen's egg in vaginal vault. Pressure over tumor caused escape of pus from urethra.			Dilated portion of urethra cut away and wound closed.		
Winckel.			Tumor the size of a walnut in vaginal vault. Pressure caused discharge of pus from urethra.			Patient cured herself by repeatedly emptying the sac and then applying lead-water poultices.		

A CASE OF DOUBLE VAGINA, WITH OPERATION.

By Hunter Robb, M. D., *Associate in Gynæcology.*

The history of the case which I wish to report to-night is briefly as follows: L. H., aged 20. Family history good. Has been married for 3 years. Nulliparous. Her catamenia first appeared at the age of 14; it was regular and usually lasted 3 days, the flow being free and unaccompanied by pain. The last menstrual period occurred three weeks before she applied to us at the dispensary. There has never been much leucorrhœal discharge. Her bowels had always been regular. She had not suffered from any urinary disturbance. Beyond this her personal history was negative. The patient came to us complaining from dyspareunia and of severe backache with bearing-down pains, and at times of a burning sensation during urination. Her general condition was good, but it was noted that the thumbs on both hands were found to be curiously undeveloped, being rather short, so that she is scarcely able to make the tips of the thumb and of the little finger meet.

The preliminary examination was extremely unsatisfactory, the patient being so nervous that she would scarcely permit the introduction of the finger into the vagina.

At a further examination under anæsthesia the following notes were made at first: "The mucous membrane about the vaginal orifice is much congested, the urethral orifice is dilated so that the first finger can be easily introduced into the bladder. The vaginal orifice itself is narrow, making the examination difficult. The cervix points downwards and the external os is patulous. The uterus is turned forwards, is freely movable, and is slightly enlarged, its surface being somewhat roughened. The right ovary is small and freely movable. The left ovary cannot be satisfactorily palpated either by examination made through the rectum or the vagina, but with the finger in the bladder the ovary can be easily made out and is found to be small and freely movable."

I had almost overlooked what proved to be the most interesting feature of the case, but my attention having been called to some further abnormality by a member of the class, upon re-examination I found that the examining finger could also be inserted into another opening in the vagina near the left lateral wall. This proved to be a second canal, which extended nearly the whole length of the vagina. A distinct membranous band of tissue separated it from the first. The measurements of the parts were noted as follows: From the upper border of the perinæum to the clitoris 6.5 cm., the remains of the hymeneal folds being found 1.5 cm. within the vagina. The hymen had been centrally perforated; on bringing the portions of the ruptured membrane together the vaginal orifice can be obliterated. The urethral orifice, which is easily dilated to a circumference of 25 mm., forms a depression above the upper limits of the hymeneal fold. The mucous membrane about the urethral orifice is intensely congested. Near the left side of the vaginal orifice there is an area of superficial ulceration measuring 1.5 cm. in diameter. The left lateral cavity is 6 cm. in length, the right 6.5 cm. The cervix uteri occupies the right vagina, being entirely shut off from the left vaginal cavity, which ends in a blind pouch. The pelvic measurement between the two anterior spines is 25 cm. The direct conjugate is 10 cm., and the intertrochanteric

measurement is 30 cm. There is also a marked diminution of the hip prominence. The pubic hair runs up into a point towards the umbilicus, after the male type. The vulva externally looks normal. Furrows in vestibule on either side measure 12 mm. in breadth. The escutcheon is well developed, and the breasts look normal.

The operation was performed on March 25, 1894. Upon introducing the blade of a Sims speculum into either orifice, the membrane which divided the two cavities could be easily demonstrated along its whole length. One finger of the left hand was passed along either side of the septum, which was then separated with scissors from without inwards as far as the cervix uteri. The uterine sound was next introduced through the cervix to determine whether or not a septum existed also in the uterus or the cervix, but none was found. The length of the uterine cavity was 7 cm. The vagina was then thoroughly irrigated with normal salt solution and 10 per cent. iodoformized gauze introduced. The patient made an uninterrupted recovery, leaving the hospital in five days, and has since returned to the dispensary saying that she feels well in every respect, the dispareunia of which she complained being entirely removed.

In this case it is worthy of note that the urethral canal was used for sexual intercourse.

These congenital anomalies of the genitalia are always interesting, and this one deviates somewhat from the form of double vagina usually met with. It will be remembered that, embryologically considered, the uterus and vagina result from the approximation and coalescence of the second and third portions respectively of the Müllerian ducts. Should for any reason the septum fail to disappear, *i. e.* if coalescence be incomplete, a double uterus or a double vagina or both result, and the double vagina most frequently met with is undoubtedly to be accounted for in this way. But another possibility has to be considered. The third portion of the Wolffian duct (ducts of the mesonephros) runs down on the lateral wall of the vagina and sometimes persists. This duct, commonly known in this region as Gartner's duct, is occasionally patulous; it sometimes opens into the vagina, and may be dilated into cysts of smaller or larger size (vaginal cysts in women and cows). The lateral disposition of the smaller of the two vaginal canals in our case, and the fact that it terminated in a blind sac and was not connected at all with the uterus, might be adduced as evidence of its origin from the Wolffian duct, but on account of its size we are rather inclined to accept the view that the case represents a somewhat unusual double vagina from noncoalescence of the lower third portions of the Müllerian ducts.

PROCEEDINGS OF SOCIETIES.

THE JOHNS HOPKINS HOSPITAL MEDICAL SOCIETY.

Meeting of February 19, 1894.

Dr. Kelly in the Chair.

Exhibition of Placenta Velamentosa.—Dr. Cullen.

This specimen is a placenta obtained from a case of twin pregnancy. There were two placentæ and two separate sets of membranes. The first set was perfectly normal. In the second the insertion of the cord is rather unusual; instead of being inserted in the center of placenta, the cord ends in the membranes about ten centimeters from the placenta, and the blood-vessels run out in the membranes to the placenta. Here we see two arteries, and a large vein which bifurcates about six centimeters before reaching the placenta. Both arteries cross over the vein before insertion. On one side the membranes are inserted about three centimeters from the margin of the placenta. Dr. Kelly thinks that the first placenta overlapped the one here exhibited, and thus prevented the membranes from reaching the margin, as is usual. Hyrtl in his Atlas gives a very fine picture of a similar placenta. This he calls "placenta velamentosa."

The Methods employed in securing Statistical Tables for Emmet's Gynecology. Exhibition of Original Tables presented by Dr. Emmet.—Dr. Kelly.

I have been greatly interested in looking over the painstaking work by Dr. Emmet preliminary to the preparation of his book on gynecology.

Dr. Emmet occupies a very unique position in the history of gynecology in this country—a position which will grow more and more important as gynecology develops and closer study is given to its history. There has been a tendency, and not without good reason, to give too great prominence to the name of Marion Sims in everything pertaining to the establishment and advancement of original gynecological research in the United States. The striking originality of his methods has largely overshadowed the efficient work of other men, especially that of Dr. T. A. Emmet.

Sims' surgery was brilliant, highly originative, and calculated to impress all who visited his clinics and saw him operate. He took up a series of operations, notably that of vesico-vaginal fistula, at a time when the operative treatment was most unsatisfactory. It is a mistake, however, to give Sims the entire credit of the discovery of the operation for vesico-vaginal fistula, as many had carefully studied this subject before and contemporary with him. Among these the able work of Dr. Jobert De Lamballe, of Paris, was especially notable, and if the mortality following his operations had not been greatly increased by diphtheritic infection of the wounded surface he would undoubtedly have presented a larger percentage of successful results than did Sims.

The character of Sims' work was on the whole erratic and spasmodic. Of the enormous number of operations performed by him in the Woman's Hospital, New York, no satisfactory records exist, and for this reason we have only a general and often an unsatisfactory knowledge of his methods.

Dr. Emmet, following in the footsteps of Sims at the Woman's Hospital, promptly instituted methods of precision in recording operations and histories of cases. His notes were elaborate, scientific and painstaking, and the book which he afterwards compiled from these records is eminently a scientific work prepared by a man pursuing scientific methods. The amount of labor put forth in the preparation of the book is, I think, unexampled in the entire literature of gynecology.

It is often said that Dr. Harris, of Philadelphia, is the greatest living medical statistician: he is a relentless investigator, and will search for months or even years for a single case. I am accustomed to associate Dr. Emmet with Dr. Harris in this respect, as his painstaking work is seen in the statistical tables, only a few of which appear in his book.

Although it may strike you that there is much in these tables which is to-day useless, you must remember that when they were compiled, gynecology was in a nascent state, and it was impossible to determine the relative value of the varied information collected by Dr. Emmet, and consequently he classified the entire subject. It gives me pleasure to exhibit three of these tables to the Society. I read you the accompanying letter :

"89 Madison Ave., N w York,
December 21, 1893.

Dear Dr. Kelly:

As soon as I opened my private hospital in 1861 I began to keep a careful record of the patients as to their history previous to admission. Unfortunately I soon became too busy a man to keep the records with any regularity as to the subsequent treatment. I treated over twenty-five hundred patients in my private hospital during some eighteen years, and up to the time when I began to prepare the tables for writing my book on Gynecology. At an early day I settled upon the plan which I have given in my book as an outline for recording the history of a case.

I wished to get at the natural history of diseases if possible, and felt from the beginning that it would prove good work, as I had a class of patients who could answer intelligently any question asked, and if unable to do so accurately the individual so stated and I noted the fact. I do not know of any other statistics of the kind which have been drawn entirely from educated people, thus giving the truth and nothing but the truth.

When I began making these tables for my book I h d no theory to prove, and during some two years every spare moment of my time was occupied in placing each detail in the history of these cases under some appropriate head. In other words, my work was not unlike seeking for the channel in an unknown harbor where, after making soundings at regular distances over the whole surface and after dotting these down as made, the course of the channel then became distinctly marked out.

I made over one hundred tables, and many of them were far more elaborate than those I gave you. Each of them was split up into smaller ones to bring out special points, of which a number are given in my book on Gynecology ; but a great number were never used, as I could not judge of the value until each had been boiled down, as it were, and then I might find the result prove unimportant. You remark that I have developed a wonderful memory for details, and it is true, for I find it a very rare circumstance that I am not ble to recall the chief features of a case if I have ever recorded the history, or if I have ever made a dr wing in connection with it.

This has proved a very important aid to me throughout my professional life, as my memory is constantly presenting some typical case in past experience. The impression made upon my brain by a digital examination is no less remarkable, as every vagina seems to have its own individual features even better marked than those of a woman's face, which I often forget, while a subsequent examination with my finger will generally recall to my mind that I have at some time seen the case before.

The statistics which I have given in my book are so accurate in every detail that I believe in years to come they will be studied more and more as the fact become recognized, and in the future may prove the means of preserving the work as an authority after the author has been forgotten.

Yours sincerely,

[Signed] Thos. Addis. Emmet."

Report of Ophthalmological Cases. An Unusual Anomaly of the Crystalline Lens, Coloboma Lentis.—Dr. Theobald.

This case is one which has been denominated, and I think correctly, coloboma of the lens. It is the only case that I have met with which I was disposed to regard as of this nature. The patient was seen a short time ago at the Baltimore Eye and Ear and Throat Hospital. She is a mulatto girl, 18 years of age, and has been employed as a nurse. There is nothing remarkable about her general condition, and one eye is practically normal. In the other eye (the left) I found a slight opacity of the lens and a very high grade of myopia. Upon dilating the pupil, I discovered this interesting condition of the lens: There was a crescentic notch at the lower border of the lens, through which the fundus of the eye could be seen, the choroid appearing of a deeper red than when viewed through the lens. There were also several limited areas of opacity in the anterior cortex of the lens. The sight of this eye was very defective, Jaeger No. 16 being read with difficulty. In this connection I may mention a very similar case which I saw some years ago, and which I reported to the American Ophthalmological Society.* In that case there was a crescentic notch in the lens almost exactly like the one in the present case. It was to the *outer* side of the lens, however, and right in line with it was a corneal scar and an anterior synechia. I regarded the lens defect in that case, not as a congenital coloboma but as a result of a wound of the lens margin. Although there was no history of a wound, it seemed to me that some sharp body, such as a pin or needle, had penetrated the cornea, iris and lens, producing the corneal scar and the anterior synechia, since just in line with these two evidences of traumatism was the little notch in the periphery of the lens. There was also a little cortical opacity about the edge of the notch. The case was discussed by several members, Dr. Kipp and Dr. Knapp among others, and they were both inclined to think that it was of congenital origin. The situation of the notch, however, seems to confirm the view which I took that it was traumatic and not congenital.

Coloboma of the lens is an extremely rare condition. I have looked over all the more recent works upon the eye which are within my reach, and I find it treated of in only one of them, De Schweinitz's recently published Diseases of the Eye. Fuchs makes but the briefest reference to it, and Noyes does not mention the subject at all. A pamphlet published by Dr. A. G. Heyl of Philadelphia, and which is referred to in de Schweinitz's book, brings together more of the literature up to the time it was published than is to be found anywhere else. This paper was read before the Fifth International Ophthalmological Congress, held in New York in 1876. In this pamphlet the author states that he has gone over the literature of the subject and has found only 18 cases, and these were chiefly reported by European observers. He speaks of it as a clinical curiosity. Coloboma of the lens is said to be frequently associated with coloboma of the iris and of the choroid, but in the cases mentioned in Heyl's paper there were a number in which there was no other congenital defect found except that in the lens. Heyl states that it is often associated with a high grade of myopia, and that lens opacities are frequently present. Both of these conditions we find in my case. He points out, too, that the coloboma *always* occurs in the lower part of the lens.† It may involve a portion of the upper part, but it never occurs entirely in the upper portion. The shape of it varies. Sometimes it is as though a portion of the periphery of the lens had been planed off, but oftener, as in this case, it is a notch with its convex aspect above. The size varies very greatly ; as much as one-third of the lens has been known to be involved. The question of etiology is of great interest, but very little light has yet been thrown upon it. Of course it cannot be explained in the same way as coloboma of the iris and of the choroid. This we can explain by the failure of the cleft in the

* Trans. American Ophthalmological Society, Vol. III, Part 3, 1882.

† In an interesting paper upon Coloboma Lentis, by Dr. W. B. Marple, which has appeared (in the New York Eye and Ear Infirmary Reports, January, 1894) since the report of my case was made to the Society, reference is made to two cases in which the coloboma was situated in the upper portion of the lens. He describes a case (in which the coloboma was in the usual downward direction) that he has recently met with, and asserts that up to the present time not more than seventeen or eighteen cases of coloboma lentis have been reported, though other cases have probably been observed.

lower part of the tunics of the eye to close, but the embryology of the lens is quite different; it is formed from the ectoderm, whereas the choroid and iris are formed from the mesoderm, and from the secondary optic vesicle, and in an entirely different way. The only suggestion as to etiology I have found is in this article of Dr. Heyl's. It is this: The nutrition of the lens in the embryonic development of the eye depends chiefly upon the hyaloid artery, which passes forward from the optic disc to the posterior pole of the lens. Having reached the posterior pole of the lens, it divides into fine branches, which distribute themselves over the posterior portion of the lens, and finally reach the periphery of the lens and pass forward over its anterior surface. At that point they are joined by numbers of small vessels from the iris. This vascular supply first reaches the posterior pole of the lens, and there the building activity is much greater; later on, as the vessels reach the periphery of the lens, the growth there becomes active. Of course these processes go on in a measure together, but the peripheral portion of the lens is later in forming than the central portion. Now, Heyl's theory is that some of the peripheral branches of the hyaloid artery fail to develop, and therefore the lens at this point, not having its blood supply to afford it nourishment, is built up in an imperfect manner. This theory seems plausible, but it fails to account for the fact that the colobomata are always found in the lower portion of the lens.

A Case of Glaucoma of Exceptional Character.—DR. THEOBALD.

One of the characteristic features of almost all cases of glaucoma is dilatation of the pupil. This is not so universally the case in simple glaucoma, but in inflammatory glaucoma it is almost invariably one of the characteristic symptoms, and this is especially the case in the advanced stage of inflammatory glaucoma, when the condition known as *glaucoma absolutum* has developed, and vision is entirely destroyed. I cannot recall having, heretofore, met with a case of this character in which there was not very decided dilatation of the pupil. There are several factors in the explanation of the dilatation of the pupil. In the first place, with the increased tension there is compression of the branches of the ciliary nerves which go to the sphincter muscle of the iris, with resulting paresis of the sphincter and consequent mydriasis. This is, perhaps, the first factor that brings about the enlargement of the pupil. Then as the disease runs its further course there occurs an atrophy of the iris tissue. This, of course, involves the muscle tissue of the sphincter, and dilatation becomes more marked. The case which I wish to bring to the attention of the Society owes its interest to the fact that this characteristic symptom of dilatation of the pupil was entirely absent. It is a case of inflammatory glaucoma, involving both eyes, which, through the neglect of the patient, had, when it recently came under my observation, reached the stage of *glaucoma absolutum*. I had seen the patient months before and had urged operation, as others had done, but she had refused to give her consent, and in consequence vision was entirely destroyed. When she came to the Johns Hopkins Hospital she had every evidence of advanced inflammatory glaucoma, except that her pupils were not in the least dilated. There was high tension, the media were steamy, vision destroyed in both eyes, marked subconjunctival injection, anterior chambers shallow; indeed every feature characteristic of glaucoma was present, except that the pupils, as I have said, were quite of the normal average size. The case, for this reason, is one certainly worthy of being placed upon record. The patient is a mulatto woman 60 years of age, engaged in housework. When she came to the hospital she was suffering intense pain. I operated for the relief of the pain, doing an iridectomy on each eye. She has been relieved of her suffering, but she remains, of course, absolutely blind. I should add that there were no synechiæ present, to prevent dilatation of the pupils, and no evidence of former iritis or of other disease than the glaucoma.

Meeting of March 5.

DR. KELLY in the Chair.

Ligation of both Internal Iliac Arteries for Hemorrhage in Hysterectomy for Carcinoma Uteri.—DR. KELLY.

I bring before you this evening an exceedingly interesting case from several standpoints, one of which is novel and I think suggestive.

The history of the case is briefly as follows: S. W., aged 37 years, married, admitted to hospital, October 7, 1893. Two para, younger child 13 years of age; labors slow and protracted, each terminated by forceps. Menses established in her thirteenth year, regular, normal in amount, lasting one week.

In September, 1893, flow became more profuse and clotted, and later did not cease between periods. For one year before menstrual derangement was observed the patient had been subject to a constant, ill-smelling leucorrhœal discharge.

Family history.—Patient knows of no one in her family who has been affected with carcinoma.

Status præsens.—The essential points in her present condition are: constant flooding, labor-like pains with the expulsion of large clots, anorexia, progressive secondary anæmia, nausea and vomiting, and sharp pains in back and lower abdomen.

Vaginal examination.—Outlet greatly relaxed as a result of difficult labors; cervix very much enlarged, filling vaginal vault, infiltrated and hard. Infiltration extends down 2 cm. on the anterior wall, posterior wall not affected. Infiltration of both broad ligaments; mobility of uterus somewhat limited, much more on right than on left side.

Diagnosis.—Carcinoma cervicis uteri extending laterally into both broad ligaments.

One of the essential points in a vaginal hysterectomy is to catch the cervix and draw it down with tractors as the broad ligaments are tied off. In this case the infiltration of the cervix was so extensive that there was no healthy, firm tissue through which to pass the traction sutures. For this reason I determined to resort to abdominal hysterectomy after having first freed the uterus from its vaginal attachments by ringing the cervix and stripping it up in the manner adopted in vaginal hysterectomy.

Upon opening the abdomen I found that the broad ligaments, especially the right, were much more infiltrated than I had anticipated.

I ligated the ovarian arteries at the pelvic brim and then began tying off the broad ligaments. The tissues were extensively infiltrated and so friable that the ligatures cut out the moment traction was put upon them. The hemorrhage was profuse and attempts to check its immediate sources were futile. As the patient was already excessively anæmic from previous hemorrhage, I determined upon the boldest procedure possible for checking the bleeding—that of entirely cutting off all pelvic circulation by the ligation of the internal iliac arteries. Accordingly the peritoneum over the arteries was incised, first on the right and then on the left side, and the arteries ligated by passing stout ligatures by means of the curved aneurism needle.

This checked all hemorrhage and I was able to proceed with the operation. I soon found, however, that I had another almost insuperable difficulty to deal with, as the left ureter was imbedded in and intimately associated with the carcinomatous mass. Above the point of its entrance into this mass there was a marked hydroureter due to the compression below. By careful dissection I freed the ureter and displaced it to one side, and continued the enucleation down towards the point of incision in the vagina.

At this stage of the operation the vital forces of the patient began to fail rapidly, the pulse increasing to 160 and the respiration becoming shallow. While I proceeded with the operation Dr. Clark transfused into the radial artery towards the heart a half litre of normal salt solution, which was promptly followed by

marked improvement in the patient's condition. Her pulse dropped rapidly from 160 to 140 and then to 120 and became full in volume.

It was perfectly evident at the completion of the operation that there was still extensive infiltration of the broad ligaments which could not be removed.

The patient made a slow but satisfactory recovery and was discharged from the hospital, November 23, 1893. Within the past week she was readmitted to the hospital for the purpose of having a vesico-vaginal fistula operated upon which was made accidentally during her previous operation.

Strange to say, after the most careful examination by rectum, vagina and abdomen I was unable to find the slightest trace of the carcinomatous process. We are keeping this patient under the closest observation to see if the carcinomatous growth has really disappeared.

The special points of interest in this case are (1) the prompt benefit derived from transfusion, and (2) the apparent cure of the carcinoma by cutting off its main blood supply.

Exhibition of Cases: Mother with Coloboma of Iris. Two Children with an Aniridia.—DR. THEOBALD.

The cases I wish to present are quite rare. The case of the mother is not quite unique, but perhaps not far from it. The mother has a large coloboma of the right eye upwards. The unusual feature is the upward position. In the left eye there is a small coloboma which is upwards and slightly outwards. There is no coloboma of the choroid, which is very often present in conjunction with coloboma of the iris. The shape of the coloboma, besides, is rather unusual. Colobomata are generally pyriform, with the apex towards the periphery of the iris, but in this instance it is more like the ordinary keyhole coloboma which one makes in operation for artificial pupil. I reported these cases to the American Ophthalmological Society some six years ago. The upward position of the coloboma gave rise to considerable comment from its unusual character, and Dr. Randall, of Philadelphia, made the statement that he had just been working up the subject and that he had not been able to find a single instance of coloboma of the iris directed upwards. Fuchs asserts that "congenital coloboma of the iris is always situated below," but follows it on the next page with the statement that he had recently met with a case of coloboma of the iris which was directed upwards.

It is of much interest that the mother, having this unusual form of coloboma iridis, should have given birth to two children with complete aniridia, that is, absence of the irides. There is no trace of the iris present in the eyes of either of the children. The girl is nine years of age, the boy is seven years old. The girl has a low grade of choroido-retinitis, and there is a very interesting form of opacity in the lens of each of her eyes, chiefly at the posterior pole. The opacity follows the septa of the lens, showing the divisions, which are very complicated in the human lens. This is true, in a measure, of the boy. Another feature, well marked in the girl, is a peripheral opacity of the cornea. This is spoken of by the authorities as being one of the conditions not infrequently met with in aniridia. Besides a little diffuse opacity of each cornea there is a fringe-like opacity around the corneal limbus, suggesting the appearance of the arcus senilis, but less dense and having a ragged edge. Vision is poor in both of these children. The girl has in one eye 20-200 vision, in the other 15-200. By holding the type close, she can make out Jaeger No. 1. The condition of the boy closely resembles that of his sister, but he has no corneal opacity, and especially none of the peripheric opacity. He has what the little girl has not—very pale optic discs, showing some atrophy of the optic nerves. His vision in one eye is 18-200, and 20-200 in the other. He is not able to read as small print as his sister. He can read Jaeger No. 4 with the left, and Jaeger No. 2 with the right eye. He has marked nystagmus and a considerable amount of hypermetropia. He has less post-polar lens opacity than the girl, but has some cortical opacity in the periphery of the lens. He had a convergent squint of the left eye, for which, in 1887, I performed a tenotomy, which seems to have fairly well corrected the defect.

A few words as to the special significance of these cases. They have an interesting bearing on the etiology of coloboma of the iris. In order to make this plain, we will have to say a word or two in regard to the embryology of the eye. The first step in the development of the eye consists of a lateral outgrowth, from the inferior portion of the fore-brain, of what is known as the primitive optic vesicle. After a short time the proximal portion of this evagination becomes constricted to a pedicle. This pedicle becomes the optic nerve. The primitive optic vesicle grows out until it finally comes in contact with the ectoderm. As soon as this takes place the ectoderm at this point becomes thickened, and following this thickening an invagination of the ectoderm occurs. In a short time this invagination is closed over, and from this invaginated portion of the ectoderm the crystalline lens is formed. At the same time that this is taking place the primitive optic vesicle changes its shape and becomes itself invaginated and gradually encircles the lens. This is called the secondary optic vesicle. The cavity of the primitive optic vesicle through this process of invagination is obliterated. The walls of the secondary optic vesicle, as is evident from the method of their formation, are composed of two layers. The distal layer goes to form the retina, and the proximal layer forms the uveal coat of the choroid. The lens has now developed more completely. Some mesodermal cells are caught between the outer coat of the ectoderm and the lens, and these form the cornea proper and part of the iris. The iris develops later, partly from the edges of the secondary optic vesicle and partly from these mesodermal cells. The different portions of the primitive optic vesicle do not all grow toward the ectoderm with the same rapidity; the upper portion grows more rapidly, and the invagination, to form the secondary optic vesicle, begins first at this point. Thus it happens that the upper part of the secondary optic vesicle forms a sort of hood above and at the sides of the lens, while below there is a gap, the choroid fissure. The failure of this gap to close is the usual cause of coloboma of the choroid and of the iris, and hence it is that such colobomata are almost without exception directed downwards. The iris does not generally form, in the normal condition, until after this gap or fissure is closed. Sometimes we have coloboma of the choroid, without coloboma of the iris, and *vice versa*.

The situation of the coloboma in the case of the mother shows that, in exceptional instances, we may have coloboma of the iris which is entirely independent of this failure to close of the choroidal fissure. The explanation would seem to be that the iris tissue failed to develop from the anterior lip of the secondary optic vesicle at the point represented by the coloboma. Now if we exaggerate this condition, we can understand what has happened in the two children; with them the outgrowth of the iris has failed, not simply over a limited area, as in the mother, but throughout the whole circumference of the margin of the optic vesicle.

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Nursing: its Principles and Practice. For Hospital and Private Use. By ISABEL ADAMS HAMPTON, Principal of the Training School for Nurses, Johns Hopkins Hospital. (*Philadelphia: W. B. Saunders.* 484 pp. 8vo.)

With the development of nursing as an art, or, if the term be preferred, a profession, which has taken place within the last twenty-five years, the older manuals and text-books on the subject have to a great extent become as obsolete as are the text-books on the practice of medicine and surgery which were favorites in 1865. A trained nurse possessing a diploma or certificate of graduation from a first-class school is now expected by physicians to know many things and to be able to do many things without special instruction from him which formerly he would have considered himself solely responsible for. Miss Hampton's book, giving as it does an outline of the plan of organization and many details of the methods employed in the training school and the nursing work in the various departments of the Johns Hopkins Hospital, is therefore interesting to physicians as well as to nurses, as indicating what a trained nurse of the present day may be expected to know and to be able to do.

Some of the older manuals on nursing appear to have been prepared with the idea that the nurse would possess no other book beside the manual aforesaid, and therefore included details of anatomy, of bandaging, of receipts for food, etc., all of which it is satisfactory to see are omitted from this new work. By the way, some competent person ought to write a book on human anatomy for the use of nurses, in which there should be, among other things, a special chapter on the topographico-anatomical peculiarities of babies. The first chapter is devoted to the general subject of training school organization and management, giving a detailed scheme of studies for thirty-six teaching weeks from October 1st to June 1st and for each year of a two years' course.

In the next edition we should like to see in this chapter some instructions as to the selection of the probationers who are to be admitted, what the physical and mental qualifications are which are to be required of candidates, and what should be the character of the examination to determine these. It is clear that Miss Hampton has a high standard for the qualifications requisite for graduation as a nurse, and her standard for admission must therefore be high.

A glance at the vocabularies at the end of the book shows that technical terms are used freely in the course of instruction, although the lists do not include quite all such terms found in the book, as for example "prodromal." Probably these vocabularies would be a little more convenient for use if combined in a single alphabetical order.

The instructions given in the many details of a nurse's work are clear and concise and up to date. As good examples may be noted those relating to hypodermic injections, to baths, and to observing and recording the symptoms of a case. The section on "hospital etiquette" is very good reading, but only an hospital official of some experience can fully appreciate it.

It is to be hoped that this book will have a wide circulation, not only among nurses but among physicians. J. S. B.

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